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Report No. 3

LOWLANDS SOUTH FOREST SECTION



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Forest Resources Inventory

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Forest Resources Inventory

1956

Report No. 3

LOWLANDS SOUTH FOREST SECTION



FOREST SERVICE

Department of Mines and Natural Resources

PROVINCE OF MANITOBA



Forest Resources Inventory Photograph of the Townsite of Lac du Bonnet. Scale 4 inches to the mile.

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Preface

This is one of a series of bulletins summarizing the results of the ground and aerial survey work which was completed in 1956 in connection with the latest Forest Inventory of Manitoba. The figures in this new series will replace those previously used based on surveys made between 1927 and 1930, and tabulated in "The Forests of Manitoba, Bulletin 85," published by the Dominion Forest Service in 1934.

For the purpose of the new Forest Inventory the Province has been divided (as shown on Map 1) into four zones based on climate, original vegetation, and predicted future use, as follows:

Agricultural Forest	Transition from Forest to Tundra Tundra or Barren Lands
------------------------	--

The Forest Zone may be defined as the area which is producing or is capable of producing forest crops and which for climatic reasons is, in the main, more suitable for the production of wood than for agricultural crops. The Forest Zone has an over-all area (omitting the three major lakes—Winnipeg, Manitoba and Winnipegosis) of about 113,238 square miles or nearly half the total area of Manitoba (less these lakes).

Based on the presence or absence of transportation routes such as railways, highways and water routes, the Forest Zone is again divided into an Accessible and Inaccessible Area.

The Accessible Forest Zone with an over-all area of about 64,122 square miles has been divided for Inventory purposes into seven main Forest Sections based on physical geography and administrative boundaries, as follows:

Southeastern Winnipeg River Lowlands South Mountain	Lowlands North Nelson River Northern Mining
--	---

Each of the Forest Sections is again divided into Working Circles which conform with Forest Ranger Districts, except in the more northerly areas where on account of their large size it has been necessary to subdivide the Ranger Districts. In addition to the seven major Forest Sections listed above, the Accessible Forest includes two minor areas in southern Manitoba—the Spruce Woods and the Turtle Mountain Forest Reserves.

The Inaccessible Forest with an over-all area of about 49,116 square miles has been divided into 20 Inventory Units.

Although a limited amount of the Forest Zone was inventoried before 1951, the main work was done commencing April 1st, 1951, from which date the Federal Government has reimbursed to the Province one-half of the expenditures incurred in forest resources inventory under the terms of an agreement with the Province pursuant to the provisions of the Canada Forestry Act.

A separate report will be published for each of the seven major Forest Sections of the Accessible Area, and an eighth report will cover the Spruce Woods and Turtle Mountain. The whole of the Inaccessible Forest will be covered by an additional report.

An explanation of the method of survey is given in the Appendix.

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PREPARED BY FOREST MANAGEMENT DIVISION

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Tables Nos. 1 to 12 by L. Pasterz.

Figures Nos. 1 to 10 by L. Pasterz.

Cover design by D. R. McTavish.



Barge load of rough lumber from Lake Winnipeg at a Winnipeg planing mill.

Forest Resources

LOWLANDS SOUTH FOREST SECTION

Location and Area

The Lowlands South Forest Section includes that portion of the Forest Zone lying between the Precambrian area of eastern Manitoba and the foot of the Manitoba escarpment on the west. The southern boundary coincides approximately with the northern boundary of settlement, while the northern boundary agrees with the administrative boundary between the Western and Northern Forest Districts. The total area covered by this report and estimate is

9,309,305 acres. This area excludes Indian Reserves but includes all other Crown and patented areas within the boundaries hatched on Map No. 2. The areas of the three major lakes—Winnipeg, Manitoba and Winnipegosis, are excluded, but all other water areas are included in the total given above. The distance from the southeast to the northwest corner of the Forest Section is approximately 350 miles. Mainly for administrative reasons, the Forest Section has been divided into subsections—Eastern, Interlake and Winnipegosis.

Table 1

Area Classification—Lowlands South Forest Section

Class of area	Crown land		Patented land		Total	
	acres	% of land area	acres	% of land area	acres	% of land area
Productive forest land*	3,957,789	51.6	375,439	39.5	4,333,228	50.2
Potentially productive forest land†	576,975	7.5	150,801	15.9	727,776	8.5
Nonproductive forest‡	1,102,178	14.3	21,718	2.3	1,123,896	13.0
Permanently nonforested land‡	2,040,346	26.6	402,511	42.3	2,442,857	28.3
TOTAL LAND	7,677,288	100.0	950,469	100.0	8,627,757	100.0
WATER	678,839	8.8	2,709	.3	681,548	7.9
TOTAL AREA	8,356,127		953,178		9,309,305	

*Land supporting merchantable timber or young growth which will produce merchantable timber within a reasonable time.

†Cut-over, burn, brush or grassland, not now supporting productive forest, but capable of doing so.

‡Land with a forest cover such as treed muskeg, treed rock, and willow or alder swamp, but incapable of producing a forest crop of merchantable size within a reasonable time.

‡Includes marsh, muskeg, rock, meadow, developed agricultural land, urban areas, roads and railroads. In general, lands not expected to produce forest of any kind.

Geology

The underlying rock of this district consists mainly of limestone of the Ordovician, Silurian and Devonian systems, but for some distance east of the Manitoba Escarpment these rocks are overlain by rocks of the Cretaceous system, most of which are shales. The rock formations, all resulting from the deposition of sediments in ocean water of varying depth, were later raised above the surface and subjected to prolonged erosion.

The advance of the continental ice-sheet in Pleistocene time had the effect of partially smoothing

the surface and covering it with a layer of glacial till. The parallel arrangement of lakes or swamps alternating with low ridges, running in a general north and south direction, is probably related to the moulding action of the advancing ice; this type of topography is especially conspicuous in the Interlake and Winnipegosis subsections.

Various deposits related to the retreat of the ice-sheet are also found. A minor end moraine skirts the foot of the Duck Mountain, and a much more conspicuous moraine extends from the tip of Long Point on Lake Winnipeg, westward along the north

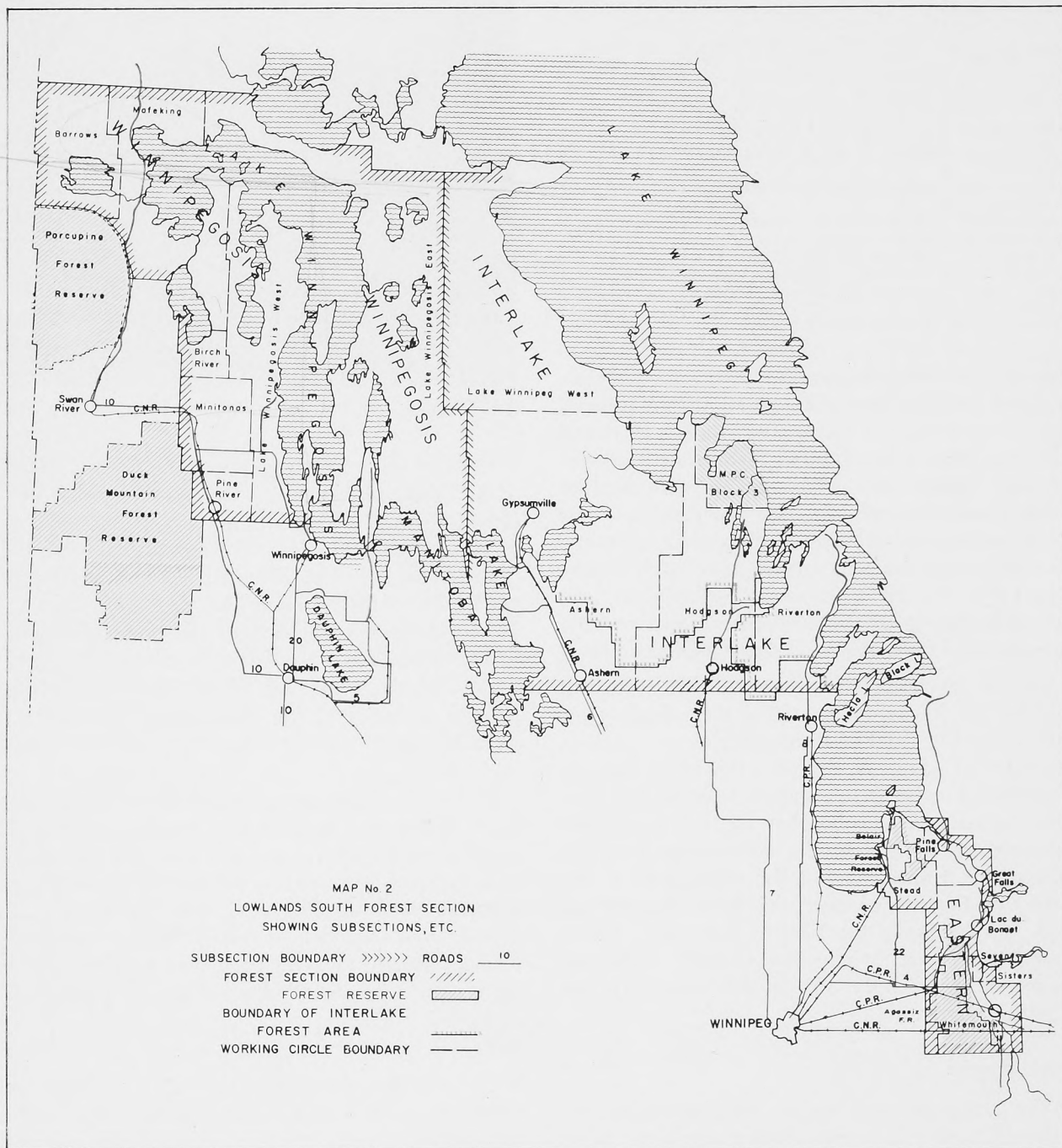


Table 2*Classification of Productive Forest Land by Cover Types and Tenure—Lowlands South Forest Section*

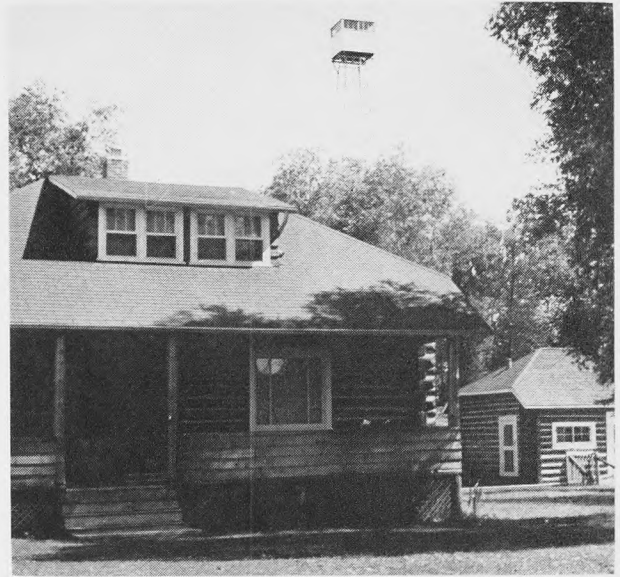
Cover type	Crown land		Patented land		Total land	
	acres	%	acres	%	acres	%
S: Over 75% softwood.....	2,087,427	52.7	74,368	19.8	2,161,795	49.9
M: 50 - 75% softwood.....	683,045	17.3	42,449	11.3	725,494	16.7
N: 25 - 50% softwood.....	440,345	11.1	73,684	19.6	514,029	11.9
H: Under 25% softwood.....	746,972	18.9	184,938	49.3	931,910	21.5
TOTAL.....	3,957,789	100.0	375,439	100.0	4,333,228	100.0

shore of Lake Winnipegosis, and along No. 10 Highway toward The Pas. The broad ridges running north and south, and consisting of sand, gravel and boulders which are prominent features of the Agassiz and Belair Forest Reserves and the Eastern Subsection in general, may have originated as interlobate moraine, in which case they are a continuation of similar features in the Sandilands Forest Reserve to the south. At points where rivers ran out from the ice-sheet, broad plains, and in some cases isolated hills, of sand and gravel were formed.

As the ice-sheet retreated northward, blocking the normal drainage channels, a great fresh-water lake formed in front of it, covering at one time or another the whole of the area described here as Manitoba Lowlands. Geologists have named this Lake Agassiz and its beaches are still prominent features, especially along the western margin of the lake where it abuts against the escarpment of the Duck and Porcupine mountains. Beach deposits are also conspicuous in the Eastern Subsection where they completely encircle the elevated hills and ridges in the vicinity of the Belair and Agassiz Forest Reserves.

Topography

The Lowlands South Forest Section is fairly level although there is a general slope towards the basin of Lake Winnipeg. Lake Winnipeg has an elevation above sea level of 713 feet while the highest recorded elevation in the Forest Section is 1,202 feet at a point near Cowan on the northeast flank of the Duck Mountain.

*Mafeking Administration Site and Tower.*

Many of the rivers originate on the eastern slopes of the Duck, Porcupine and Pasquia mountains; two of them—the Red Deer and the Swan, coming from great valleys between the mountains. All of these drain through Lakes Winnipegosis and Manitoba and by way of the Dauphin River to Lake Winnipeg. In the Interlake Subsection, the Mantagao and Fisher rivers, and a number of rivers further north, drain directly into Lake Winnipeg; while in the Eastern Subsection, the Brokenhead drains into Lake Winnipeg and the Whitemouth into the Winnipeg River.

Due to the linear arrangement of the low drumlinoid ridges and the old lake beaches mentioned under Geology above, and the fact that the slope of the surface is apt to be crosswise of these ridges, drainage is often interrupted, with the result that considerable areas behind these ridges are occupied by lake, marsh, muskeg, and treed muskeg at the worst, or black spruce pulpwood stands at the best.

Soils

The majority of the normally drained soils of the Lowlands South Forest Section belong to the Greywooded Zone. Such soils are developed under somewhat moist conditions and under a forest vegetation of mixed hardwood and coniferous species. The parent material is high in lime and consists mainly of lake-washed boulder till with occasional limestone outcrops, although there are deposits of fine

textured clays and loams along the river valleys and around some of the bays on the larger lakes. Local deposits of sand and gravel originating as outwash deposit or end moraine are found in the Agassiz and Belair Forest Reserves and in the The Pas-Long Point moraine. Peat soils occur where drainage has been blocked by the low ridges mentioned above under Topography.

Climate and Natural Vegetation

Weather observations in this area have not been kept at a sufficient number of stations and for a long enough time to give a very accurate average. One station at Moosehorn Bay on Lake Manitoba showed an average of 20.38 inches of precipitation over a 22-year period. Using this station and adjoining stations outside the area, it would appear that the average annual precipitation is from 16 to 22 inches, being higher in the vicinity of the major lakes and lower along the foot of the escarpment which borders the Forest Section on the west. June and July are the months of heaviest precipitation.

The average mean daily maximum temperature for July varies with location from 75° to 77° above and the January mean daily minimum from 11° to 16° below zero. The average length of the period free from killing frost, taken at 29.5°, is from 115 to 122 days, and the frost free period using 32° varies from 95 to 115 days.

The Lowlands South Forest Section corresponds approximately with the southern portion of the Manitoba Lowlands Section, B 15, as mapped in "A Forest Classification for Canada." Normally drained sites usually have a tree cover of white spruce, balsam fir, poplar and birch; poorly drained sites tend towards black spruce with varying percentages of tamarack; and excessively drained sites support jack pine. The prevalence of forest fires in the past has increased the percentage of aspen and jack pine and, in some cases, led to their taking over sites on which formerly only a few specimens occurred.

There are some interesting extensions into this Forest Section of tree species which are more common in Ontario and Minnesota. White cedar occurs in a number of small isolated stands at a number of points in the Interlake and Winnipegosis sub-sections, the most northwesterly being in Twp. 50, Rge. 26 W.P.M. The northwesterly limit of bur oak occurs near Mafeking; white elm, green ash and Manitoba maple are found on the flood plains of the rivers and on lacustrine soils around the bays of the larger lakes. Since the total volume of these minor species is small, no separate estimate of volume has been made. The coniferous shrub, ground hemlock, *Taxus canadensis* Marsh, is found at a number of locations on islands and shores of Lake Winnipeg and in at least one location on Lake Winnipegosis.



Figure 1.

History

In the early days of the fur-trade this area seems to have been inhabited by Assiniboine Indians along the southwestern border, and by Crees to the north-east. La Verendrye used a canoe route by Lake Manitoba and Lake Winnipegosis in travelling between his main depot at Fort la Reine (now Portage la Prairie) and his Fort Bourbon on Cedar Lake and Poskoyac (now The Pas). After the end of the French regime the independent traders from Montreal continued to use this as a main route to the West and in addition established local posts on Red Deer, Steeprock, Shoal, Swan and Mossy rivers. Meadow Portage between Lake Manitoba and Lake Winnipegosis and the Mossy portages between Lake Winnipegosis and Cedar Lake were strategic points on the fur-trade route.

After 1790, the Northwest Company appear to have begun to use Lake Winnipeg as their main route between their Saskatchewan and Athabaska posts and Montreal. Following the union with the Hudson's Bay Company in 1821 this route was reversed and furs went north from Lake Winnipeg to York Factory. Much of the trade from the prairies continued to go by a route through Lakes Winnipegosis and Manitoba and down the Dauphin River to join the main route on Lake Winnipeg.

For 50 years after the union of the fur-trading companies, the development of the country which

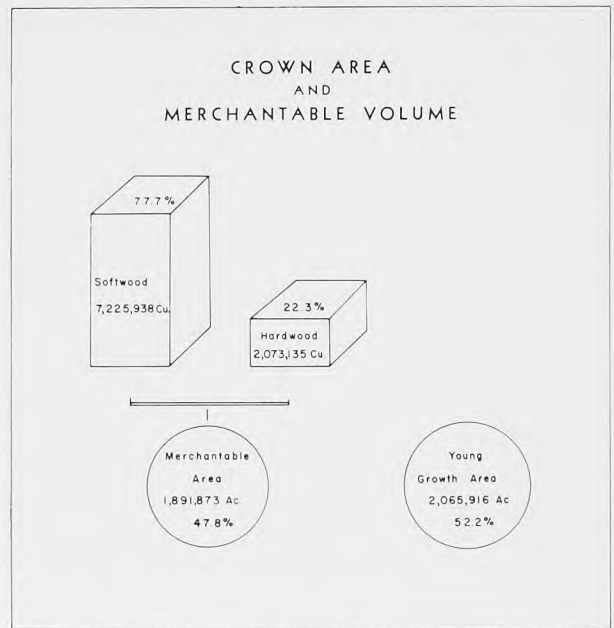


Figure 2.

was later to become Manitoba proceeded very slowly. The Red River remained the only agricultural settlement and this was, more or less, dependent on the fur company for the sale of its products. Records show that the Hudson's Bay Company purchased from the settlers, oak boards and staves, elm and oak timber, portage straps, blanketing, cloth, coating, as well as agricultural products.



White spruce sawlogs decked at mill on Lake Winnipegosis.

These goods as well as pemmican from the uncultivated plains were used for the maintenance of the fur-trading posts throughout the Northwest.

The posts in the forest area used timber as logs in the round, or sometimes squared with the broad axe. Boards when made had to be sawn laboriously by man-powered pit-saws. As settlement developed along the forest fringe, water-powered sawmills were installed where streams were suitable.

Development of the Area

The initiation of steamboat navigation on the Red River in 1859 followed by the first railway train in 1878 signalled the beginning of a rapid settlement of the southern prairies. There was an immediate demand for timber in the form of lumber for settlers' farmsteads, and for the building of towns, while the railways needed large quantities of cross ties.

Table 3
Area Classification of Productive Forest by Age Classes, Cover Types and Merchantability—Lowlands South Forest Section

AGE CLASS <i>years</i>	COVER TYPES IN ACRES									
	S		M		N		H		Total	
	Unmerch.	Merch.	Unmerch.	Merch.	Unmerch.	Merch.	Unmerch.	Merch.	Unmerch.	Merch.
CROWN LANDS										
0 - 20.....	92,157	277	261,020	.....	244,905	99	378,521	395	976,603	771
21 - 40.....	246,696	153,040	33,862	157,833	13,773	90,789	65,593	170,190	359,924	571,852
41 - 60.....	720,704	121,574	6,163	122,386	2,329	62,855	193	100,355	729,389	407,170
61 - 80.....	.....	576,791	.....	57,536	.....	20,374	.....	25,622	.....	680,323
81 - 100.....	.....	155,597	.....	41,501	.....	4,923	.....	5,971	.....	207,992
101 - over.....	.....	20,591	.....	2,744	.....	298	.....	132	.....	23,765
SUBTOTAL.....	1,059,557	1,027,870	301,045	382,000	261,007	179,338	444,307	302,665	2,065,916	1,891,873
TOTAL.....	2,087,427		683,045		440,345		746,972		3,957,789	
PATENTED LANDS										
0 - 20.....	3,931	68	8,175	.....	35,281	3	78,035	.....	125,422	71
21 - 40.....	22,583	3,845	11,795	17,447	13,121	16,823	43,903	36,678	91,402	74,793
41 - 60.....	28,262	11,806	172	2,979	.....	7,072	.....	22,428	28,434	44,285
61 - 80.....	.....	2,981	.....	1,720	.....	1,335	.....	3,819	.....	9,855
81 - 100.....	.....	892	.....	112	.....	49	.....	75	.....	1,128
101 - over.....	.....	.....	.....	49	.....	.....	.....	.....	.....	49
SUBTOTAL.....	54,776	19,592	20,142	22,307	48,402	25,282	121,938	63,000	245,258	130,181
TOTAL.....	74,368		42,449		73,684		184,938		375,439	
ALL LANDS										
0 - 20.....	96,088	345	269,195	.....	280,186	102	456,556	395	1,102,025	842
21 - 40.....	269,279	156,885	45,657	175,280	26,894	107,612	109,496	206,868	451,326	646,645
41 - 60.....	748,966	133,380	6,335	125,365	2,329	69,927	193	122,783	757,823	451,455
61 - 80.....	.....	579,772	.....	59,256	.....	21,709	.....	29,441	.....	690,178
81 - 100.....	.....	156,489	.....	41,613	.....	4,972	.....	6,046	.....	209,120
101 - over.....	.....	20,591	.....	2,793	.....	298	.....	132	.....	23,814
SUBTOTAL.....	1,114,333	1,047,462	321,187	404,307	309,409	204,620	566,245	365,665	2,311,174	2,022,054
TOTAL.....	2,161,795		725,494		514,029		931,910		4,333,228	

CROWN AREA
DISTRIBUTED INTO LAND CLASSES

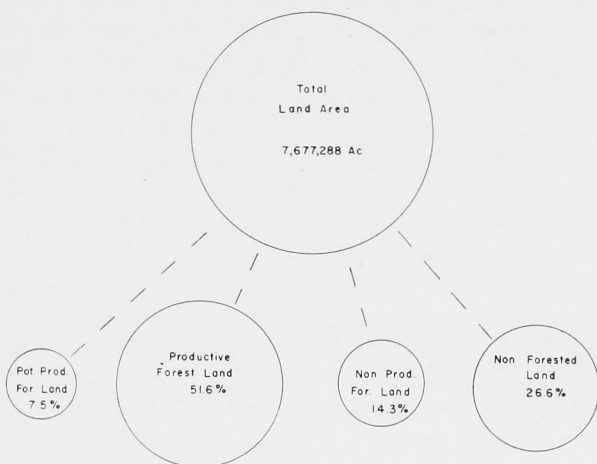


Figure 3.

The three great lakes of Manitoba—Winnipeg, Manitoba and Winnipegosis, had the necessary timber on their shores and on tributary streams. The railway reached Selkirk in 1878, thus connecting with Lake Winnipeg by the navigable Red River. The Manitoba and Northwestern Railway reached Westbourne on the Whitemud River in 1882, and it was expected that this river would be the route for forest products to be brought from the north end of Lake Manitoba, and, also, from Lake Winnipegosis which connects with Lake Manitoba by the Waterhen River, and which may also be reached by the short Meadow Portage. Lake Winnipegosis was reached by the Canadian Northern Railway at the town of the same name in 1897, thus giving a more practical access to the forests around this lake.

The introduction of steam engines gave a convenient source of power for driving the sawmills,

CROWN
PRODUCTIVE FOREST LAND
BY COVER TYPE AND MERCHANTABILITY
TOTAL AREA 3,957,789 ACRES

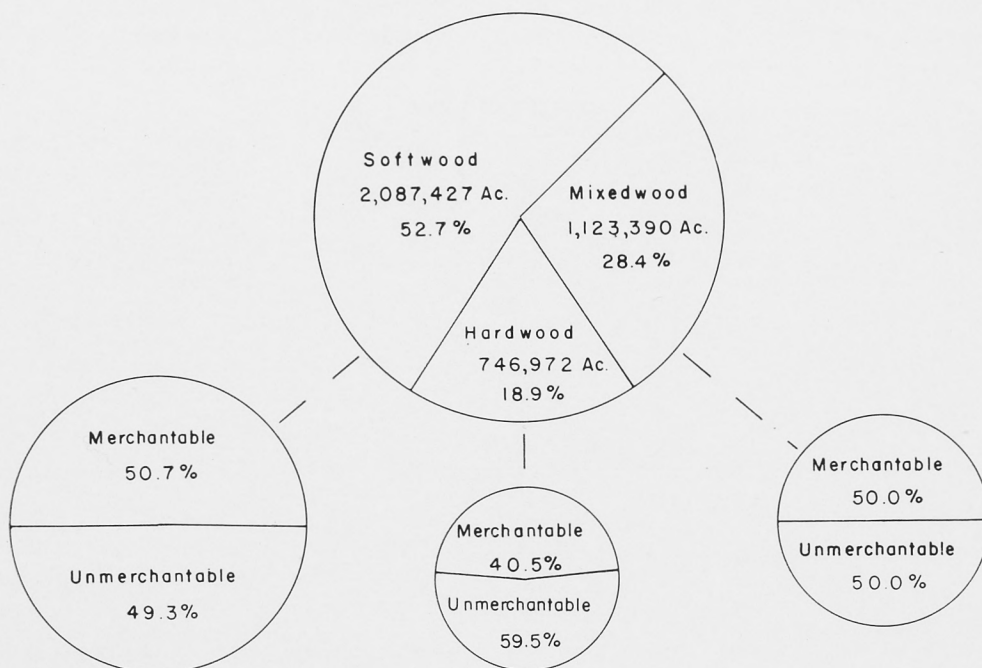


Figure 4.

Table 4

*Softwood and Hardwood Volume by Age Classes and Cover Types—
Lowlands South Forest Section*

*VOLUME IN CUNITS BY COVER TYPE (1 Cunit equals 100 cu. ft. of wood)															
Age class years	S			M			N			H					
	Softwood	Hardwood	Total	Softwood	Hardwood	Total	Softwood	Hardwood	Total	Softwood	Hardwood	Total			
CROWN LANDS															
0 - 20	741	.....	741	.....	.....	.....	76	106	182	38	561	599	855	667	1,522
21 - 40	637,402	.....	665,635	404,053	115,419	519,472	173,186	128,532	301,718	39,492	428,702	468,194	1,254,133	700,886	1,955,019
41 - 60	784,246	.....	827,537	658,403	184,401	842,804	215,557	137,997	373,554	55,620	342,753	398,373	1,713,826	728,442	2,442,268
61 - 80	1,856,526	.....	1,885,684	465,563	131,419	596,982	105,669	82,363	188,032	35,912	143,450	179,362	2,463,670	386,390	2,850,060
81 - 100	1,105,916	.....	1,143,718	403,582	110,142	513,724	39,607	39,718	79,325	20,140	55,201	75,341	1,569,245	242,863	1,812,108
101 - over	188,423	.....	192,081	33,554	7,805	41,359	1,786	1,390	3,176	446	1,034	1,480	924,209	13,887	938,096
TOTAL	4,573,254	.....	4,715,396	1,965,155	549,186	2,514,341	535,881	410,106	945,987	151,648	971,701	1,123,349	7,225,938	2,073,135	9,299,073
PATENTED LANDS															
0 - 20	177	.....	177	.....	.....	.....	3	3	6	.....	.....	.....	180	3	183
21 - 40	11,182	.....	11,723	31,877	8,728	40,605	26,758	19,906	46,664	9,302	86,502	95,804	79,119	115,677	194,796
41 - 60	54,236	.....	55,694	14,928	3,909	17,937	20,470	14,733	35,203	11,359	61,500	72,859	100,093	81,600	181,693
61 - 80	18,358	.....	19,187	12,365	3,281	15,646	5,503	3,921	9,424	7,260	19,641	26,901	43,486	27,672	71,158
81 - 100	5,808	.....	5,848	308	98	406	214	153	367	203	541	744	6,533	832	7,365
101 - over	.....	.....	.....	510	163	673	.....	.....	.....	.....	.....	.....	510	163	673
TOTAL	89,761	.....	92,629	59,088	16,179	75,267	52,948	38,716	91,664	28,124	168,184	196,308	929,921	225,947	455,868
ALL LANDS															
0 - 20	918	.....	918	.....	.....	.....	79	109	188	38	561	599	1,035	670	1,705
21 - 40	648,584	.....	677,358	435,930	124,147	560,077	199,944	148,438	348,382	48,794	515,204	563,998	1,333,252	816,563	2,149,815
41 - 60	838,482	.....	883,231	672,431	188,310	860,741	236,027	172,730	408,757	66,979	404,253	471,232	1,813,919	810,042	2,623,961
61 - 80	1,874,884	.....	1,904,871	477,928	134,700	612,628	111,172	86,284	197,456	43,172	163,091	206,263	2,507,156	414,062	2,921,218
81 - 100	1,111,724	.....	1,149,566	403,890	110,240	514,130	39,821	39,871	79,692	20,343	55,742	76,085	1,575,778	243,695	1,819,473
101 - over	188,423	.....	192,081	34,064	7,968	42,032	1,786	1,390	3,176	446	1,034	1,480	924,719	14,050	938,769
TOTAL	4,663,015	.....	4,808,025	2,024,243	565,365	2,589,608	588,829	448,822	1,037,651	179,772	1,139,885	1,319,657	7,455,859	2,299,082	9,754,941

*Net roundwood volume: stump height 1', top diameter 3"; one stacked cord equals approximately 85 cu. ft. of wood.

CROWN
MERCHANTABLE AREA AND MERCHANTABLE VOLUME
BY AGE CLASSES

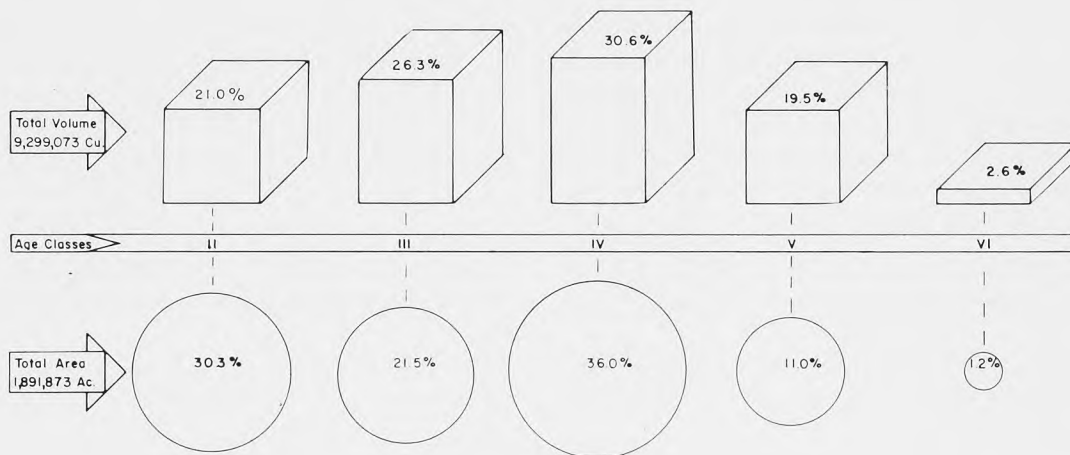
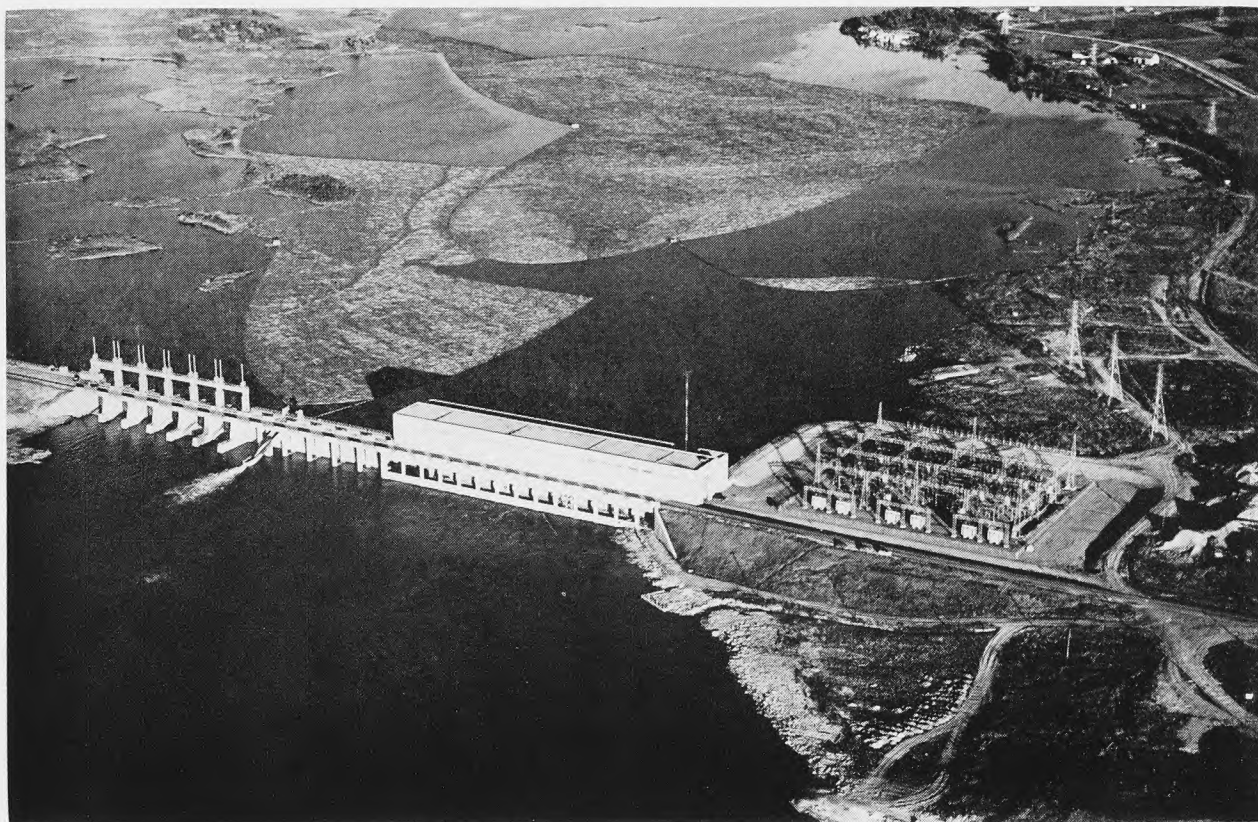


Figure 5.



Pulpwood booms at Pine Falls power plant.

Manitoba Hydro-Electric Board

and for transporting the lumber, etc., to the railways.

Lake Winnipeg was naturally the first of the lakes to be exploited for lumber and records show that there were sawmills at the mouths of the Brokenhead and the Winnipeg rivers around 1870. Timber operations soon extended as far north as the narrows, and somewhat later reached Fisher, Kinnow and Sturgeon bays on the west shore beyond the narrows. Among the pioneering names in lumbering on Lake Winnipeg are Peter McArthur, Brown and Rutherford and T. A. Burrows.

Shortly after the railway reached Westbourne, a steamboat was built on the Whitemud River by Peter McArthur and, as a result, lumbering was opened up on Lake Manitoba. The completion of the Canadian Northern Railway to the town of Winnipegosis made the forest resources of the lake of the same name accessible to the outside world

and timber berths were granted covering large areas of good white spruce saw-timber on the shores and islands.

The Canadian Northern Railway was completed to Erwood on the Saskatchewan boundary in 1899, thus opening up important timber areas along the foot of the Manitoba escarpment. Railway access to the southern fringe of the Interlake area was given by Canadian Pacific lines to Arborg in 1910 and to Riverton in 1914, while Canadian Northern lines reached Gypsumville in 1910, and Hodgson in 1914.

The development of the pulp and paper industry in the 1920's opened up a market for black spruce which although mature was too small for use as lumber. More recently, the development of all weather roads has led to better utilization of various forest products. Among these roads may be mentioned the highway connecting Mafeking with The

Table 5
*Softwood and Hardwood Volume by Cover Types and Size Classes—
Lowlands South Forest Section*

Cover type	VOLUME IN CUNITS (100 cu. ft. Units)								
	Softwood			Hardwood			Total		
	4" - 9"	10" +	Total	4" - 9"	10" +	Total	4" - 9"	10" +	Total
CROWN LANDS									
S.....	4,205,973	367,281	4,573,254	98,432	43,710	142,142	4,304,405	410,991	4,715,396
M.....	1,356,740	608,415	1,965,155	315,276	233,910	549,186	1,672,016	842,325	2,514,341
N.....	411,196	124,685	535,881	280,969	129,137	410,106	692,165	253,822	945,987
H.....	92,340	59,308	151,648	736,931	234,770	971,701	829,271	294,078	1,123,349
TOTAL.....	6,066,249	1,159,689	7,225,938	1,431,608	641,527	2,073,135	7,497,857	1,801,216	9,299,073
PATENTED LANDS									
S.....	82,907	6,854	89,761	1,932	936	2,868	84,839	7,790	92,629
M.....	45,873	13,215	59,088	10,484	5,695	16,179	56,357	18,910	75,267
N.....	43,072	9,876	52,948	28,587	10,129	38,716	71,659	20,005	91,664
H.....	18,248	9,876	28,124	133,914	34,270	168,184	152,162	44,146	196,308
TOTAL.....	190,100	39,821	229,921	174,917	51,030	225,947	365,017	90,851	455,868
ALL LANDS									
S.....	4,288,880	374,135	4,663,015	100,364	44,646	145,010	4,389,244	418,781	4,808,025
M.....	1,402,613	621,630	2,024,243	325,760	239,605	565,365	1,728,373	861,235	2,589,608
N.....	454,268	134,561	588,829	309,556	139,266	448,822	763,824	273,827	1,037,651
H.....	110,588	69,184	179,772	870,845	269,040	1,139,885	981,433	338,224	1,319,657
TOTAL.....	6,256,349	1,199,510	7,455,859	1,606,525	692,557	2,299,082	7,862,874	1,892,067	9,754,941

CROWN COMPARISON OF SOFTWOOD TO HARDWOOD VOLUME BY AGE CLASSES



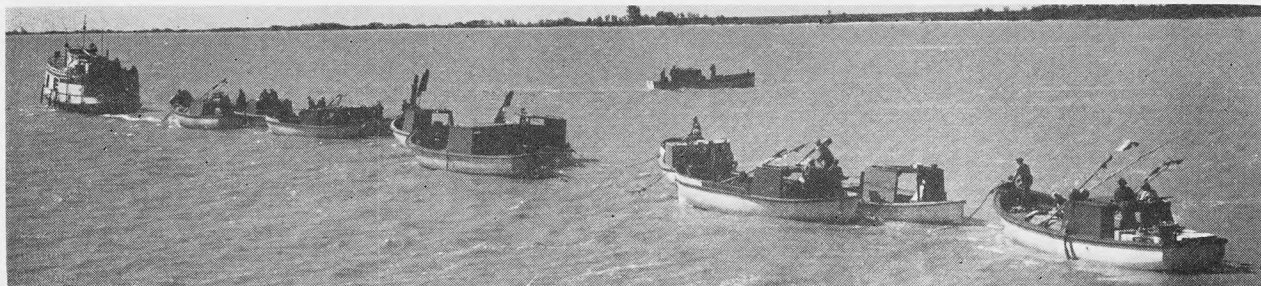
Figure 6.

Pas, a forest access road leading to the narrows of Lake Winnipeg, and a similar road leading to Lake St. George on the west side of Fisher Bay, Lake Winnipeg. Despite the increase in hauling by road, lake transportation is still used; barge-loads of pulpwood and rough lumber are brought down Lake Winnipeg and delivered to Pine Falls and Winnipeg. Lumber rafts continue to be brought down Lake Winnipegosis from Dawson and Pelican bays to a planing mill at the town of Winnipegosis.

An analysis of the figures in Table 1 will show that 11 per cent of the total land is in private ownership. Settlement is concentrated along the

Whitemouth and Winnipeg rivers in the Eastern Subsection; south of Washow Bay, around Hodgson, and along the railway between Ashern and Gypsumville in the Interlake Subsection; and along the railway at the foot of the Duck Mountain and Porcupine Forest Reserves in the Winnipegosis Subsection. Most of these settlements may be considered as permanent and as having reached their economic limit as to area, although there will no doubt be some minor adjustments in forest boundaries as time goes on.

Mining activities are confined to the extraction of gypsum, limestone, sand and gravel, all of which are found in large quantity.



Fishing Fleet on Lake Winnipeg.

Photo courtesy Manitoba Government,
Dept. of Industry and Commerce.

Table 6

*Softwood and Hardwood Volume by Species and Size Classes—
Lowlands South Forest Section*

Species	*CUNITS BY DIAMETER CLASSES						†SAW TIMBER
	Total		4" - 9" D.B.H.		10" + D.B.H.		10" and Over
	<i>volume</i>	<i>per cent</i>	<i>volume</i>	<i>per cent</i>	<i>volume</i>	<i>per cent</i>	M. ft. b.m.
CROWN LANDS							
White spruce.....	2,208,523	23.7	1,321,899	17.7	886,624	49.2	398,981
Black spruce.....	2,891,636	31.1	2,780,601	37.1	111,035	6.2	49,966
Balsam fir.....	1,288,396	13.9	1,194,844	15.9	93,552	5.2	42,098
Jack pine.....	675,107	7.3	608,560	8.1	66,547	3.7	29,946
Tamarack.....	162,276	1.7	160,345	2.1	1,931	.1	869
TOTAL SOFTWOOD.....	7,225,938	77.7	6,066,249	80.9	1,159,689	64.4	521,860
Poplar.....	1,367,302	14.7	995,905	13.3	371,397	20.6	167,129
White birch.....	705,833	7.6	435,703	5.8	270,130	15.0	121,558
TOTAL HARDWOOD.....	2,073,135	22.3	1,431,608	19.1	641,527	35.6	288,687
TOTAL ALL SPECIES.....	9,299,073	100.0	7,497,857	100.0	1,801,216	100.0	810,547
PATENTED LANDS							
White spruce.....	83,737	18.4	53,622	14.7	30,115	33.1	13,552
Black spruce.....	78,406	17.2	73,811	20.2	4,605	5.1	2,072
Balsam fir.....	51,028	11.2	47,102	12.9	3,926	4.3	1,767
Jack pine.....	11,713	2.5	10,554	2.9	1,159	1.3	521
Tamarack.....	5,027	1.1	5,011	1.4	16	.....	7
TOTAL SOFTWOOD.....	229,921	50.4	190,100	52.1	39,821	43.8	17,919
Poplar.....	158,522	34.8	131,189	35.9	27,333	30.1	12,300
White birch.....	67,425	14.8	43,728	12.0	23,697	26.1	10,664
TOTAL HARDWOOD.....	225,947	49.6	174,917	47.9	51,030	56.2	22,964
TOTAL ALL SPECIES.....	455,868	100.0	365,017	100.0	90,851	100.0	40,883
ALL LANDS							
White spruce.....	2,292,260	23.5	1,375,521	17.5	916,739	48.5	412,533
Black spruce.....	2,970,052	30.5	2,854,412	36.3	115,640	6.1	52,038
Balsam fir.....	1,339,424	13.7	1,241,946	15.8	97,478	5.1	43,865
Jack pine.....	686,820	7.0	619,114	7.9	67,706	3.6	30,467
Tamarack.....	167,303	1.7	165,356	2.1	1,947	.1	876
TOTAL SOFTWOOD.....	7,455,859	76.4	6,256,349	79.6	1,199,510	63.4	539,779
Poplar.....	1,525,824	15.7	1,127,094	14.3	398,730	21.1	179,429
White birch.....	773,258	7.9	479,431	6.1	293,827	15.5	132,222
TOTAL HARDWOOD.....	2,299,082	23.6	1,606,525	20.4	692,557	36.6	311,651
TOTAL ALL SPECIES.....	9,754,941	100.0	7,862,874	100.0	1,892,067	100.0	851,430

†Saw timber figures were obtained by converting the cubic foot volume of the size class, 10" D.B.H. and over, to board feet on the assumption that one cubic foot is equal to 4.5 board feet.

*One cunit equals 100 cubic feet of wood; one cord equals 85 cubic feet of wood.

CROWN COMPARISON OF SAW-TIMBER TO CORDWOOD VOLUME FOR SOFTWOOD AND HARDWOOD

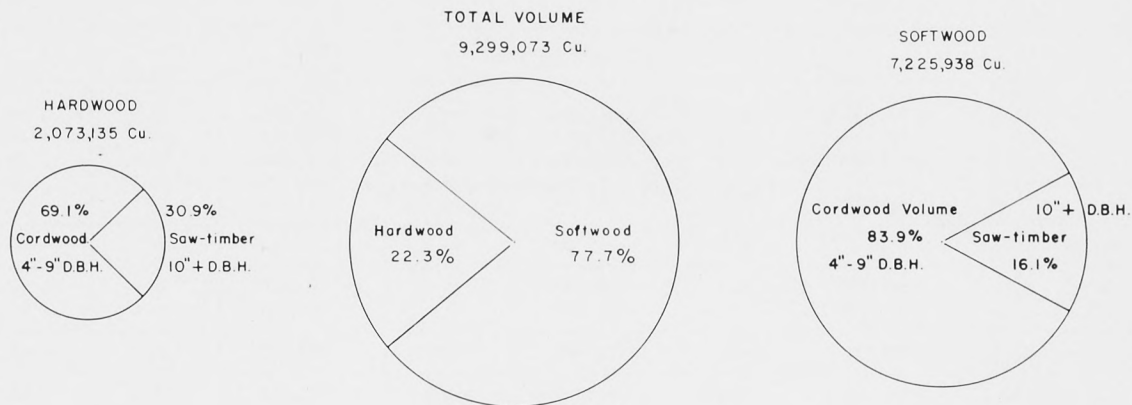


Figure 7.

Apart from the power sites on the Winnipeg River, which have been referred to in Report No. 2, no hydro-electric development has taken place in the Lowlands South. However, studies are being carried out in connection with the possible development of a power site on the Dauphin River, involving the diversion of the Saskatchewan River through Lakes Winnipegosis and Manitoba and thence into the Dauphin River.

Manitoba's commercial fisheries produce about one-third of Canada's fresh-water fish and about half of this volume comes from Lake Winnipeg, although Lakes Manitoba and Winnipegosis are also important producers. Pickerel, sauger, whitefish, tullibee, pike, bass and goldeye are important species.

A registered trapline district was set up in the Winnipegosis Subsection of this area in 1954 and a Fur Rehabilitation Block on the east side of the Interlake Subsection, in 1941. Fur production in the area is good, and includes muskrat, mink, beaver, weasel, squirrel, fox, otter, marten and lynx. Game birds are abundant and include ducks, geese, sharp-tail grouse and partridge. Deer are plentiful in all

sections of the area with moose, elk and woodland caribou in some localities.

Popular summer resorts have been developed at Grand Beach and Victoria Beach and on the east shore of Lake Winnipeg and Gull Lake a few miles



Limestone Plant on No. 10 Highway.

inland, while lesser known resorts are Gull Harbor on Hecla Island and Beaver Creek on the west shore of Washow Bay. Resorts in the Winnipegosis area especially attractive to fishermen are Waterhen Ferry, Steeprock Bay, Red Deer River and Overflowing River.

Forest Administration

Prior to 1930, the forests of Manitoba were administered along with the other natural resources by the Federal Government. Timber outside the Forest

Reserves (and there were none in this area), was handled by the Timber and Grazing Branch of the Department of the Interior, while the Forestry Branch of the same Department was responsible for fire protection on all Crown lands and for timber management on Forest Reserves only. The chief method of timber disposal was by the sale of timber licences, covering areas up to 50 square miles, renewable annually as long as sufficient timber remained on the berth to make it commercially valuable. Timber permits were also issued to indi-

Table 7
Cubic Foot Volume per Acre—Softwood and Hardwood by Age Classes and Cover Types—Lowlands South Forest Section

Age class years	VOLUMES IN CUBIC FEET PER ACRE BY COVER TYPE														
	S			M			N			H			Total		
	Soft-wood	Hard-wood	Total	Soft-wood	Hard-wood	Total	Soft-wood	Hard-wood	Total	Soft-wood	Hard-wood	Total	Soft-wood	Hard-wood	Total
CROWN LANDS															
0 - 20.....	268	.....	268	.....	.....	.....	77	107	184	10	142	152	111	86	197
21 - 40.....	417	18	435	256	73	329	191	141	332	23	252	275	219	123	342
41 - 60.....	645	36	681	538	151	689	343	251	594	55	342	397	421	179	600
61 - 80.....	322	5	327	809	228	1,037	519	404	923	140	560	700	362	57	419
81 - 100.....	711	24	735	972	265	1,237	804	807	1,611	337	925	1,262	754	117	871
101 - over.....	915	18	933	1,223	284	1,507	599	467	1,066	338	783	1,121	944	58	1,002
MERCHANTABLE.....	445	14	459	514	144	658	299	229	528	50	321	371	382	110	492
PRODUCTIVE FOREST.....	219	7	226	288	80	368	122	93	215	20	130	150	183	52	235
PATENTED LANDS															
0 - 20.....	260	.....	260	.....	.....	.....	100	100	200	.....	.....	.....	254	4	258
21 - 40.....	291	14	305	183	50	233	159	118	277	25	236	261	106	154	260
41 - 60.....	460	12	472	471	131	602	290	208	498	51	274	325	226	184	410
61 - 80.....	616	28	644	719	191	910	412	294	706	190	514	704	441	281	722
81 - 100.....	651	5	656	275	88	363	437	312	749	271	721	992	579	74	653
101 - over.....	.....	.....	.....	1,041	332	1,373	.....	.....	.....	.....	.....	.....	1,041	332	1,373
MERCHANTABLE.....	458	15	473	265	72	337	209	153	362	45	267	312	177	173	350
PRODUCTIVE FOREST.....	121	4	125	139	38	177	72	52	124	15	91	106	61	60	121
ALL LANDS															
0 - 20.....	266	.....	266	.....	.....	.....	77	107	184	10	142	152	123	79	202
21 - 40.....	414	18	432	249	71	320	186	138	324	24	249	273	206	126	332
41 - 60.....	629	33	662	537	150	687	337	247	584	55	329	384	402	179	581
61 - 80.....	324	5	329	807	227	1,034	512	397	909	147	554	701	363	60	423
81 - 100.....	711	24	735	971	265	1,236	801	802	1,603	336	922	1,258	754	116	870
101 - over.....	915	18	933	1,220	285	1,505	599	467	1,066	338	783	1,121	944	59	1,003
MERCHANTABLE.....	445	14	459	500	140	640	288	219	507	49	312	361	369	113	482
PRODUCTIVE FOREST.....	216	6	222	279	78	357	115	87	202	19	123	142	172	53	225

CROWN
 MERCHANTABLE VOLUME OF SOFTWOOD
 BY AGE CLASSES
 MERCHANTABLE VOLUME 7,225,938 CUNITS

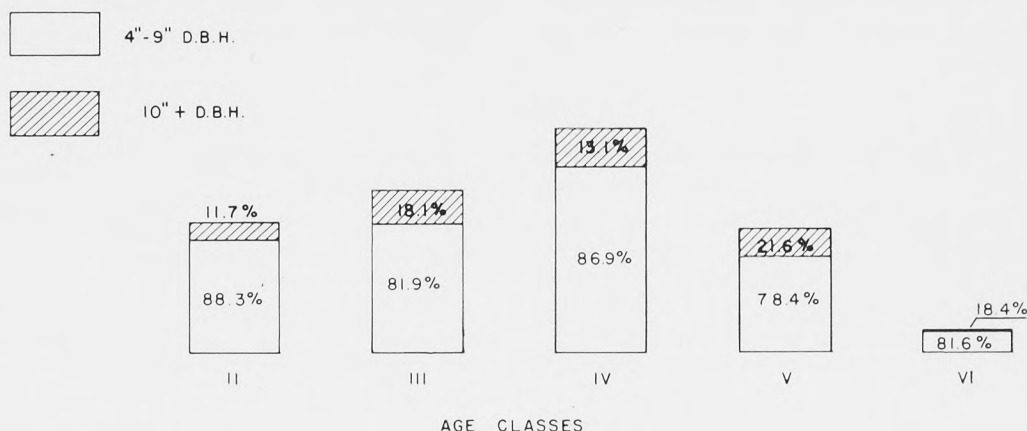


Figure 8.

viduals for amounts up to 200 cords of pulpwood or fuelwood. Permits to settlers for their own use were issued for lumber, building logs and fence posts up to the equivalent of \$50.00 in dues, annually. Pulpwood Berth No. 1 was granted in 1927, with a large number of separate blocks in this area. As a result of consolidation in 1953, Block 3 was granted in lieu of other surrendered areas.

Most of the Lowlands South area was photographed in 1927 by the oblique method following which it became possible to map the topography and forest types with reasonable accuracy. Extensive forest surveys were carried out during the years 1927-29 in connection with the selection of blocks for Pulpwood Berth No. 1.

The transfer of the natural resources to the Province in 1930 led to a considerable reorganization of forestry administration. The control of timber disposal, fire protection, and other phases of forestry was combined under the Forest Service, Department of Mines and Natural Resources. There has been a gradual improvement in timber administra-

tion along with an increase in field staff, consisting of forest rangers and technical foresters. Licensed berths have lapsed and no new berths have been granted, most of the timber now being disposed of by timber sales, each of which has its own special conditions. These sales are put up to public auction after cruising, and have a term of from one to seven years. Pulpwood permits have been considerably restricted in the interests of conservation, and settlers' permits have become of less importance with the passing of the pioneer phase of land settlement.

The Lowlands South Forest Inventory Section covered in this report includes part of the Eastern and part of the Western administrative districts. The Eastern and Interlake subsections of the inventory are administered as part of the Eastern Forest District, under a District Forester with headquarters in Winnipeg; the Winnipegosis Subsection of the inventory is part of the Western Forest District, under a District Forester with headquarters in Dauphin. The Forest Districts are divided into

CROWN
MERCHANTABLE HARDWOOD VOLUME
BY AGE CLASSES
MERCHANTABLE VOLUME 2,073,135 CUNITS

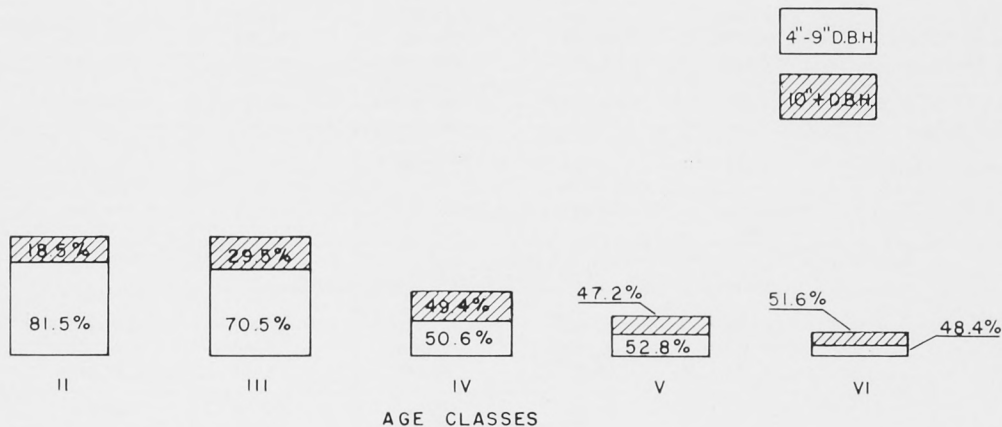


Figure 9.

Forest Ranger Districts, eight under Eastern and six under Western administration.

Soil surveys by the provincial Forest Service have covered most of the Eastern Subsection. As a result of these surveys, the Agassiz and Belair Forest Reserves (covering 275 and 53.5 square miles, respectively) were established in 1954. A soil survey of the southern fringe of the Interlake Subsection in 1952 led to the establishment of the Interlake forest area to include all lands north of an established line. In other areas, a tentative boundary has been established between forest and agricultural lands, the forest lands being termed "General Reserve."

Fire Protection

Fire is the main enemy of the forest in Manitoba and nowhere is this more noticeable than in the Interlake and Winnipegosis areas where the series of parallel, north and south running ridges and swamps may carry fire from the south far into the wooded area. Years may elapse when the country

is too wet to burn, but then may come a period of dry years with disastrous results to forest growth. Lightning fires are rare in this type of country and probably 99 per cent of the fires are man-caused. There is evidence that the forest, especially the coniferous forest, has retreated considerably to the northward, especially since settlement came.

To remedy this situation, it has been necessary to determine by a land classification survey just where settlement should stop. Following this, a fireguard is required along the southern boundary of the forest area. A classification survey of the Interlake area was completed in 1952 and a boundary has been established beyond which land is reserved from sale. Due to the nature of the country a continuous plowed fireguard is not practicable, and it has been decided to substitute a graded road which, besides acting as a fireguard, will give access to the boundary area. Considerable progress has been made on construction of this fireguard road in the section between Washow Bay and Ashern.

Table 8
Area Classifications by Subsections—Lowlands South Forest Section

Subsections	LAND CLASSES IN ACRES					
	Productive forest		Potentially Productive	Non-Productive Forest	Permanently Nonforested Land	Total Land
	Unmerchantable	Merchantable				
CROWN LANDS						
Eastern unoccupied.....	192,169	144,656	61,322	44,832	75,439	518,418
Interlake unoccupied.....	1,002,777	904,347	274,597	395,906	976,545	3,554,172
Winnipegosis unoccupied.....	870,133	783,308	239,100	661,440	896,080	3,450,061
Total unoccupied.....	2,065,079	1,832,311	575,019	1,102,178	1,948,064	7,522,651
Interlake: Pulpwood Berth No. 1, Block 3..	837	59,562	1,956	.....	92,282	154,637
TOTAL.....	2,065,916	1,891,873	576,975	1,102,178	2,040,346	7,677,288
PATENTED LANDS						
Eastern.....	106,371	46,836	54,187	15,261	134,833	357,488
Interlake.....	123,113	47,278	66,648	3,352	190,138	430,529
Winnipegosis.....	15,774	36,067	29,966	3,105	77,540	162,452
TOTAL.....	245,258	130,181	150,801	21,718	402,511	950,469
ALL LANDS						
Eastern.....	298,540	191,492	115,509	60,093	210,272	875,906
Interlake.....	1,126,727	1,011,187	343,201	399,258	1,258,965	4,139,338
Winnipegosis.....	885,907	819,375	269,066	664,545	973,620	3,612,513
TOTAL.....	2,311,174	2,022,054	727,776	1,123,896	2,442,857	8,627,757

The Lowlands South Forest Section has 21 look-out towers within its bounds and these towers are coordinated with other towers in adjoining areas. Towers are connected to administrative bases and to one another by telephone line, by radio, or both. The whole area is included within the "wooded area" as defined in the Fires Prevention Act, and no fire may be set out in connection with agricultural clearing or the burning of brush during the "closed season," April 1st to November 15th, until the owner, tenant, or occupant has obtained a burning permit from a fire guardian.

Float-equipped aircraft of the Manitoba Government Air Service are used for fire detection when hazard conditions warrant but the main function of aircraft is in transportation of men and equipment to fires. Ground patrols in the settlement fringe are made by Forest Service motor vehicles and motor boats are used on the larger lakes.

Area Classification and Forest Composition

Of the total land area in the Lowlands South, 50.2 per cent has been classified as productive forest land and 8.5 per cent as potentially productive, or a total of 58.7 per cent capable of producing timber crops, see Table 1.

Table 2 shows the relatively high percentage of softwood. The combined "S" and "M" cover types (50-100 per cent softwood) make up 66.6 per cent of the productive forest area, leaving 33.4 per cent for the combined "N" and "H" cover types (0-50 per cent softwood), see definition of cover type in Appendix.

Considering volume by species, black spruce leads, followed by white spruce, poplar, and balsam fir. It should be pointed out that poplar includes the two species, aspen and balsam poplar, which were not separated in the field tally. It is estimated that

about 76 per cent of the poplar volume consists of aspen. The percentage of jack pine (7 per cent), is low as compared with other forest sections, this, no doubt, reflecting the relatively small proportion of dry sites.

Reference is made to Tables 1 to 7 which give area and volume data for the whole Forest Section and to Tables 8 to 12 giving similar information by subsections.

Forest Inventory

For most of the area sufficient ground control for the aerial photography was available from land lines established in past years by the Dominion

Land Surveys and the Provincial Surveys Branch; township subdivision work had been done for all areas except the northern part of the Interlake and Winnipegosis subsections, and here the existing base lines, 24 miles apart, were sufficient for control. However, there were islands and peninsulas on Lakes Winnipeg and Winnipegosis where insufficient control existed. The Surveys Branch ran a number of winter traverses on the ice to tie in these areas.

Aerial photography of the vertical type covered the whole area during the summers of 1946 to 1950, inclusive. Most of the area was photographed at a scale of 1:15,840, although some of the more

Table 9
Area Classification of Productive Forest by Subsections, Cover Types and Merchantability—Lowlands South Forest Section

Subsections	AREA IN ACRES									
	S		M		N		H		Total	
	Unmerch.	Merch.	Unmerch.	Merch.	Unmerch.	Merch.	Unmerch.	Merch.	Unmerch.	Merch.
CROWN LANDS										
Eastern unoccupied.....	127,049	53,400	23,303	25,246	3,668	17,700	38,149	48,310	192,169	144,656
Interlake unoccupied.....	507,060	574,614	136,069	185,579	176,104	57,905	183,544	86,249	1,002,777	904,347
Winnipegosis unoccupied.....	424,698	364,415	141,586	155,425	81,235	97,234	222,614	166,234	870,133	783,308
TOTAL UNOCCUPIED.....	1,058,807	992,429	300,958	366,250	261,007	172,839	444,307	300,793	2,065,079	1,832,311
Interlake: Pulpwood Berth No. 1, Block 3	750	35,441	87	15,750	.....	6,499	.....	1,872	837	59,562
SUBTOTAL.....	1,059,557	1,027,870	301,045	382,000	261,007	179,338	444,307	302,665	2,065,916	1,891,873
TOTAL.....	2,087,427		683,045		440,345		746,972		3,957,789	
PATENTED LANDS										
Eastern.....	42,216	12,458	12,535	9,520	6,093	10,101	45,527	14,757	106,371	46,836
Interlake.....	9,756	3,761	7,306	9,807	41,631	6,997	64,420	26,713	123,113	47,278
Winnipegosis.....	2,804	3,373	301	2,980	678	8,184	11,991	21,530	15,774	36,067
SUBTOTAL.....	54,776	19,592	20,142	22,307	48,402	25,282	121,938	63,000	245,258	130,181
TOTAL.....	74,368		42,449		73,684		184,938		375,439	
ALL LANDS										
Eastern.....	169,265	65,858	35,838	34,766	9,761	27,801	83,676	63,067	298,540	191,492
Interlake.....	517,566	613,816	143,462	211,136	217,735	71,401	247,964	114,834	1,126,727	1,011,187
Winnipegosis.....	427,502	367,788	141,887	158,405	81,913	105,418	234,605	187,764	885,907	819,375
SUBTOTAL.....	1,114,333	1,047,462	321,187	404,307	309,409	204,620	566,245	365,665	2,311,174	2,022,054
TOTAL.....	2,161,795		725,494		514,029		931,910		4,333,228	

CROWN MERCHANTABLE VOLUME BY SPECIES

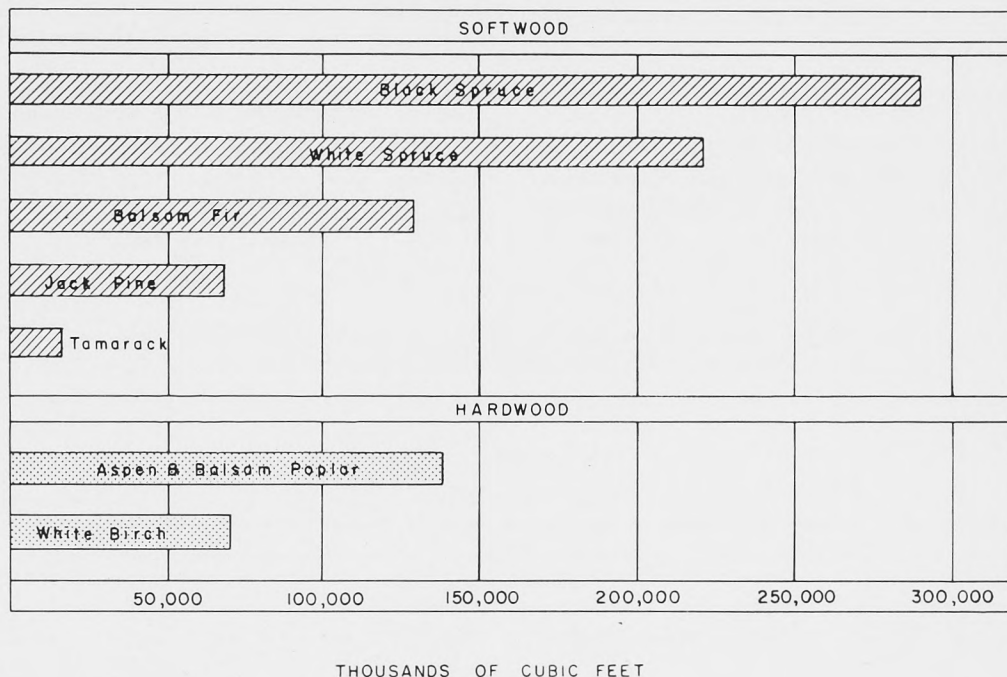


Figure 10.



Manitoba Government Air Service aircraft
on Red Deer River.

northerly area had scales varying from 1:21,360 to 1:36,000. In all cases the final forest maps were produced at either 1:15,840 or at 1:31,680, i.e., at either 4 inches or 2 inches per mile.

Base mapping of the Interlake and Winnipegosis subsections was done by the Provincial Surveys Branch. In the Eastern Subsection, this procedure was not necessary, as sufficient survey lines were visible on the photographs.

A field party consisting of seven men covered the Washow Bay area in 1950. In 1951, a similar party worked the Eastern Subsection and an area west of Fisher Bay, and another party worked the Winnipegosis Subsection. Winter cruising was done on Lake Winnipegosis from February to April, 1951.

A total of 2,177 sample plots of one-fifth acre

Table 10
*Softwood and Hardwood Volume by Size Classes and Subsections—
 Lowlands South Forest Section*

Subsections	VOLUME IN CUNITS (100 cu. ft. Units)					
	Softwood		Hardwood		Total	
	4" - 9"	10" +	4" - 9"	10" +	4" - 9"	10" +
CROWN LANDS						
Eastern unoccupied.....	358,519	52,967	166,056	63,080	524,575	116,047
Interlake unoccupied.....	2,677,391	463,750	450,862	202,969	3,128,253	666,719
Winnipegosis unoccupied.....	2,611,594	516,509	742,474	305,505	3,354,068	822,014
TOTAL UNOCCUPIED.....	5,647,504	1,033,226	1,359,392	571,554	7,006,896	1,604,780
Interlake: Pulpwood Berth No. 1, Block 3.....	418,745	126,463	72,216	69,973	490,961	196,436
TOTAL.....	6,066,249	1,159,689	1,431,608	641,527	7,497,857	1,801,216
PER CENT.....	84.0	16.0	69.1	30.9	80.6	19.4
PATENTED LANDS						
Eastern.....	86,952	9,100	45,170	11,938	132,122	21,038
Interlake.....	48,358	13,390	63,110	15,393	111,468	28,783
Winnipegosis.....	54,790	17,331	66,637	23,699	121,427	41,030
TOTAL.....	190,100	39,821	174,917	51,030	365,017	90,851
PER CENT.....	82.7	17.3	77.4	22.6	80.1	19.9
ALL LANDS						
Eastern.....	445,471	62,067	211,226	75,018	656,697	137,085
Interlake.....	3,144,494	603,603	586,188	288,335	3,730,682	891,938
Winnipegosis.....	2,666,384	533,840	809,111	329,204	3,475,495	863,044
TOTAL.....	6,256,349	1,199,510	1,606,525	692,557	7,862,874	1,892,067
PER CENT.....	83.9	16.1	69.9	30.1	80.6	19.4

were tallied, and this data was used in preparing tree and stand volume tables, see Table 13, and Appendix. In 1952 and 1953, two-man checking parties covered areas along the settlement edge and in the northern part of the Interlake Subsection. Forest maps and estimates were completed in January, 1955.

Forest Utilization and Working Plans

The Lowlands South Forest Section is estimated to contain 5,061,004 acres of land which is either growing forest crops or is capable of growing them. A small extension of agricultural development may take place in this area, more especially in the form

of ranching, in the area around the north shore of Lake Manitoba and Waterhen Lake. Taking into consideration existing patented land and probable extension for agriculture, it is estimated that there will remain about 4,000,000 acres suitable only for forestry. The southern and western portions of the Forest Section are fairly accessible but much of the northern part of the Interlake awaits development by access roads.

At the present time, white spruce lumber is the most important product of the forests in this Forest Section, the greater part coming from the shores and islands of Lake Winnipegosis and the west

Table 11

Softwood and Hardwood Volume by Land Tenure and Subsections—Lowlands South Forest Section

Subsections	VOLUMES IN 100 CUBIC FOOT UNITS (Cunits)		
	Softwood	Hardwood	Total
CROWN LANDS			
Eastern unoccupied.....	411,486	229,136	640,622
Interlake unoccupied.....	3,141,141	653,831	3,794,972
Winnipegosis unoccupied.....	3,128,103	1,047,979	4,176,082
TOTAL UNOCCUPIED.....	6,680,730	1,930,946	8,611,676
Interlake:			
Pulpwood Berth 1, Block 3...	545,208	142,189	687,397
TOTAL.....	7,225,938	2,073,135	9,299,073
PER CENT.....	77.7	22.3	100.0

PATENTED LANDS

Eastern.....	96,052	57,108	153,160
Interlake.....	61,748	78,503	140,251
Winnipegosis.....	72,121	90,336	162,457
TOTAL.....	229,921	225,947	455,868
PER CENT.....	50.4	49.6	100.0

ALL LANDS

Eastern.....	507,538	286,244	793,782
Interlake.....	3,748,097	874,523	4,622,620
Winnipegosis.....	3,200,224	1,138,315	4,338,539
TOTAL.....	7,455,859	2,299,082	9,754,941
PER CENT.....	76.4	23.6	100.0

shore of Lake Winnipeg. Sawing is done by portable mills operated by gasoline or Diesel power.

Black spruce pulpwood production is important and, in this case, due to transportation costs, the larger proportion of the cut comes from the areas closest to the pulp mills to the east and south.

Poplar is sawn into lumber and used in construction and as box material, also as plywood and pulpwood. The main use of jack pine is for railway ties and mining timber although a certain amount goes into lumber. Balsam fir is sold to a limited extent as pulpwood and some lumber is sawn.

Tables 8 to 12, inclusive, show inventory figures by subsections and not by Working Circles. Each subsection is divided into a number of Working



Aerial view showing Mafeking administrative site and village.

Table 12

Softwood and Hardwood Volume per Acre Merchantable Area by Land Tenure, Cover Type and Subsections—Lowlands South Forest Section

Subsections	VOLUME PER ACRE IN CUBIC FEET		
	Softwood	Hardwood	Total

CROWN LANDS

Eastern unoccupied.....	285	158	443
Interlake unoccupied.....	347	72	419
Winnipegosis unoccupied.....	399	134	533
TOTAL UNOCCUPIED.....	365	105	470
Interlake:			
Pulpwood Berth 1, Block 3...	915	239	1,154
AVERAGE.....	382	110	492

PATENTED LANDS

Eastern.....	205	122	327
Interlake.....	131	166	297
Winnipegosis.....	200	250	450
AVERAGE.....	177	173	350

ALL LANDS

Eastern.....	265	149	414
Interlake.....	371	86	457
Winnipegosis.....	390	139	529
AVERAGE.....	369	113	482

$$AAC = \frac{1,138,315}{30} = 37,944 \text{ cunits/yr.}$$

Table 13

General Stand Volume Table—Lowlands South Forest Section
(Data from Final Set of Curves)

Height class	DENSITY CLASSES							
	(In square feet of basal area per acre at breast height)							
	A 0' - 20'	B 20' - 40'	C 40' - 60'	D 60' - 80'	E 80' - 100'	F 100' - 120'	G 120' - 140'	H 140' - 160'
VOLUME IN CUNITS PER ACRE (100 cu. ft. Units)								
4 (30' - 40').....	1.24	3.38	5.62	7.75	10.00	12.12	.....	.....
5 (40' - 50').....	1.70	4.75	7.75	10.80	13.80	17.00	20.12	.....
6 (50' - 60').....	2.15	6.10	10.00	13.95	17.80	21.90	25.75	.....
7 (60' - 70').....	.....	7.45	12.25	17.00	21.85	26.75	31.60	36.38
8 (70' - 80').....	.....	8.75	14.40	20.15	25.80	31.65	37.25	43.00
9 (80' - 90').....	.....	.....	.....	23.20	29.80	36.45	43.00	49.50

Volumes refer to Gross Round Wood Volume to 3" top and 12" stump.

Based on 2,177 one-fifth acre plots measured in the field.

Circles or Forest Ranger Districts, the boundaries of which are indicated in Map No. 2. The Eastern Subsection includes Whitemouth, Stead, and parts of Seven Sisters, Lac du Bonnet, and Pine Falls. The Interlake Subsection covers Riverton, Hodgson, Ashern, Lake Winnipeg West, and Block 3 of Pulpwood Berth No. 1. Winnipegosis Subsection includes Winnipegosis East, Winnipegosis West, and parts of Pine River, Minitonas, Birch River, Mafeking, and Barrows. Separate tables have been prepared for each of these Working Circles but these tables are not included in this report.

Preliminary working plans have been prepared for the Working Circles in the Eastern Subsection and also for Riverton, Hodgson, and Ashern in the Interlake Subsection. The annual allowable depletion has been established for each species on the basis of the present inventory. Work is now proceeding on a revision of this inventory, using new photo-

graphs and more intensive field work. When this work has been completed, the present working plans will be revised and made more comprehensive.

Reforestation

The establishment of a new forest crop after fire or logging should be brought about mainly by natural regeneration, either by seed from remaining trees or by vegetative growth from stumps or roots or from the rooting of lower branches which often occurs in black spruce. Fortunately, natural regeneration is reasonably successful in this Forest Section.

Where repeated fires have eliminated seed trees, artificial reforestation by planting or seeding is the only method of restoring the forest. A start has been made in planting some of these areas in the Agassiz Forest Reserve where, from 1954 to the present, some 700,000 trees have been planted.

Appendix

SURVEY METHODS

Ground Control

Ground control for aerial photographs was obtained mainly from base lines, township outlines, and subdivision surveys established either before or during the progress of the forest inventory. The distance between control lines varied from one mile in the southern part to as much as 72 miles in the north. In certain cases it was necessary to make traverses of winter roads, lakes, and rivers in order to fill in blanks where cadastral surveys were lacking.

Air Photography

The photographs on which the inventory was based were summer verticals varying in scale from 1:15,840 to 1:36,000, taken mainly in the period 1946 to 1953, inclusive.

Base Mapping

The slotted template lay-down method of base mapping was used. A base map consisted simply of a large sheet of paper showing township grids on which were located the primary and secondary control points of the photographs covering the area.

Field Surveys

The type classification used in this survey was an adaptation of the system developed by S. T. B. Losee of the Abitibi Power and Paper Company. Types were differentiated by species, composition, height, density, site, and subtype, the following breakdown being employed:

(a) *Cover-type*

- S : 75-100% conifers by basal area
- M : 50- 75% conifers by basal area
- N : 25- 50% conifers by basal area
- H : 0- 25% conifers by basal area

(b) *Height Class*

- 1 : Average height of main stand 0-10 feet
- 2 : Average height of main stand 10-20 feet
- 3 : Average height of main stand 20-30 feet
- Etc.

(c) *Density Class*

- A : 0-20 square feet per acre basal area
- B : 20-40 square feet per acre basal area
- C : 40-60 square feet per acre basal area
- Etc.

(d) *Site*

- V₁ : Jack pine ridge top
- V₂ : Black spruce ridge top
- W : Hardwood upper slope
- X₁ : Black spruce lower slope
- X₂ : Mixed lower slope
- Y₁ : Jack pine flat
- Y₂ : Poplar flat
- Z₁ : Wet flat (black spruce)
- Z₂ : Cedar flat

(e) *Sub-type*

- 1 : 0- 12% of conifer basal area jack pine
- 2 : 13- 37% of conifer basal area jack pine
- 3 : 38- 62% of conifer basal area jack pine
- 4 : 63- 87% of conifer basal area jack pine
- 5 : 88-100% of conifer basal area jack pine

The above subtypes were used in conjunction with all four cover-type symbols—S, M, N, and H, depending on the percentage of jack pine in the coniferous portion of the stand. Additionally, in the S cover-type there might be tamarack subtypes. These were shown by the suffixes L1, L2, L3, L4, and L5, denoting the same percentage of tamarack volume as the first suffixes did for jack pine.

The term type-aggregate has been used as referring to all types in a Forest Section which have common characteristics as to cover-type, height, density, site, and subtype. For example, the symbol "S7EX₁-1" denotes a type with 75-100 per cent of the basal area in coniferous species, average height 60-70 feet, basal area per acre 80 to 100 square feet, growing on a lower slope site and mainly black spruce, with a jack pine composition less than 12 per cent of the coniferous basal area.

Sampling was distributed as widely as possible over the total inventory area, the twin objectives being to obtain sufficient data for local tree and type-aggregate volume tables, and to familiarize the photo-interpreters with the varying stand conditions to be found in different localities.

Sampling was by means of one-fifth-acre plots (one-quarter chain wide by eight chains long) established at fixed intervals along cruise lines selected by the party chief. In order to obtain a well-distributed sample of all type-aggregates, the party chiefs were instructed to sample as many type

aggregates as possible from each camp site, and not to take too many plots in one particular type in the same general area. Information recorded on each plot included the cover-type, site class, tally by species of all trees over 3.5 inches D.B.H., and four height-age measurements of representative trees. Notes were also made on the topography, soil and young growth, minor vegetation, and the general condition of the stand. Sufficient form class measurements were made to determine for each species the relationship between form class, diameter, height, and site. Special notes were made on young growth areas.

Forest Maps

The location of all boundary lines between the various forest types was determined almost entirely from examination of the photographs with the aid of a stereoscope.

After photo interpretation, both forestry and planimetric information was transferred from the photos to the base maps by means of either a Sketchmaster or Seelyscope. The areas of the various forest strata were determined either by dot count or by measurement with a planimeter.

Each finished forestry map covers one township at the 1:15,840 scale, or four townships at smaller scales. Ozalid prints of the completed maps were prepared for distribution to district personnel and one master copy of each map was hand-colored for filing, using the standard colors recommended by the Federal Forestry Branch.

Interpretation and Compilation

After field sampling in a given area was completed, the final photo interpretation was made. Since it is on the quality of this work that the accuracy of the inventory largely depends, an effort was made to have the man most familiar with a particular area make the final photo interpretation for that area. Much of the final interpretation was done in the field by the party chiefs and cruisers at a time when stand conditions as they appeared on both the ground and the photos could readily be compared.

The first step in compilation was the transfer of field data to two sets of summary sheets. The height-age and form class data obtained from measurements of sample trees was used to prepare local tree volume tables, while the data on the tally sheets was the basis for the type-aggregate volume tables.

For each Forest Section, separate tree volume tables were prepared for each species, site, and height class. The Dominion Form Class Volume Tables were used in conjunction with the height-age and form class data to prepare the local volume tables. The standard system of harmonizing curves was used.

The next step was the preparation of a general stand volume table showing gross volume per acre, all species combined. Field plot data was segregated by height and density classes regardless of site and cover-type. Using the method of least squares and linear regression a series of straight lines was drawn and later harmonized by the Dwight method. Values read from these lines formed a general stand volume table showing average volume in cunits per acre by height and density classes for the whole Forest Section. See Table No. 13.

The next step was the determination of the proportion of each species in each type-aggregate. This was done by a special method of percentages and curves. Similar methods were used to determine the proportion of the two size classes, four to nine inches D.B.H., and ten inches plus. The percentages as arrived at by harmonizing the curves for each height class were applied to the previously calculated general stand volume table, and the results were tabulated as the final type-aggregate volume table.

Up to this point in compilation, stand age was not considered. However, the large number of height-age measurements obtained in the field made it possible to establish by means of a series of curves, the relationship between site, height, and age for each of the major species on each site. Age classes could then be assigned to all type-aggregates. Thus, when the final volume summaries were made, they were subdivided by cover-type and age class only; height, site, and density being omitted.

Gross volumes of each individual type were first tabulated in cubic feet by numbered types and later compiled in township units by species, cover-type, age class, size class, and land tenure.

In order to express the net rather than the gross volume, a cull factor was established for each species in each Forest Section. This factor was based on a general knowledge of the various species, and notes made by the cruisers regarding defects observed on the sample plots. The cull factor was applied to the gross figures for the Work-

ing Circle and not to township. See Table 14.

Table 14

Cull Factor by Species—Lowlands South Forest Section

<i>Species</i>	<i>Cull per cent</i>
White spruce.....	5
Black spruce.....	5
Balsam fir.....	25
Jack pine.....	25
Tamarack.....	10
White cedar.....	40
Aspen.....	50
Balsam poplar.....	50
White birch.....	40

Reports

Fifty-five inventory summaries were compiled for Working Circles or Ranger Districts, each of these units averaging about 1,000 square miles in area. Each summary contains a breakdown of the area and net volume by cover-types and age classes. Subtotals are included for the Crown and patented portions of each unit. Net volumes are expressed in both cunits (100 cu. ft. units) and M ft.b.m. for the ten inch plus diameter group, and in cunits alone for the four to nine inch D.B.H. group. These inventory summaries were totalled by Forest Sections, and a report is being published on the forest resources of each Forest Section.

ROTATION

The length of the rotation for the various species depends on the site, the product to be cut, and, to a lesser extent, the climatic region. Table 15 gives tentative figures for the productive forest area of Manitoba. A range of rotation age is given depending mainly on whether the stand is to be cut for pulpwood or saw-timber.

Table 15

Rotation by Species

<i>Species</i>	<i>years</i>
White spruce.....	80 - 120
Black spruce.....	80 - 140
Balsam fir.....	60 - 80
Jack pine.....	60 - 90
Tamarack.....	70 - 100
Cedar.....	100 - 200
Aspen poplar.....	50 - 70
Balsam poplar.....	50 - 70
White birch.....	60 - 80

ALLOWABLE CUT

A determination of the allowable annual depletion by cutting, fire, etc., is necessary in order that the forest may be kept on a sustained yield basis. The compiled inventory data presents volume by cover-type, age class, and species while area is presented by age class and cover-type only. The method of calculation most suitable to the available data is by a volumetric formula.

The simplest formula for finding the annual yield, commonly known as the Von Mantel formula, is as follows:

$$\text{Annual Yield} = \frac{\text{Growing Stock}}{\text{Half the number of years in rotation}}$$

For general inventory purposes this formula has been used as the basis for calculation of the allowable cut by Working Circles, each species being calculated separately according to its average rotation age. A deduction of 20 per cent has been made to allow for contingencies such as loss from fire, windfall, insects, and disease.

In those areas which have established Working Plans such as the Southeastern Forest Section, the Duck Mountain Forest Reserve, Pulpwood Berth No. 1, and certain portions of the Lowlands South Forest Section, various alternative methods have been used in arriving at the Allowable Cut. It is usual in these cases to secure a more accurate estimate of the Allowable Cut by methods which take into account any unevenness in age class distribution.

* * *

Common and Botanical Names of Tree Species Included in Timber Estimates

CONIFERS

White Spruce —	<i>Picea glauca</i> (Moench) Voss
Black Spruce —	<i>Picea mariana</i> (Mill) BSP.
Balsam fir —	<i>Abies balsamea</i> (L.) Mill
Jack pine —	<i>Pinus banksiana</i> Lamb.
Tamarack —	<i>Larix laricina</i> (Du Roi) K. Koch
Cedar —	<i>Thuja occidentalis</i> L.

HARDWOODS

Aspen poplar —	<i>Populus tremuloides</i> Michx
Balsam poplar —	<i>Populus balsamifera</i> L.
White birch —	<i>Betula papyrifera</i> Marsh.

DATE DUE SLIP

ing Circle and not to township. See Table]

Cull Factor by Species

Species
White spruce.....
Black spruce.....
Balsam fir.....
Jack pine.....
Tamarack.....
White cedar.....
Aspen.....
Balsam poplar.....
White birch.....

Reports

Fifty-five inventory Working Circles or F units averaging about Each summary contains and net volume by Subtotals are included portions of each unit. both cunits (100 cu. the ten inch plus d alone for the four to inventory summaries tions, and a report is resources of each Fo

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Jack pine.....	60 - 90
Tamarack.....	70 - 100
Cedar.....	100 - 200
Aspen poplar.....	50 - 70
Balsam poplar.....	50 - 70
White birch.....	60 - 80

ALLOWABLE CUT

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Growing Stock

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SD 146 M3 M27 1956 NO-3
MANITOBA FORESTRY BRANCH
FOREST RESOURCES INVENTORY
1956

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SD 146 M3 M27 1956 no.3
Manitoba. Forestry Branch
Forest resources inventory,
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